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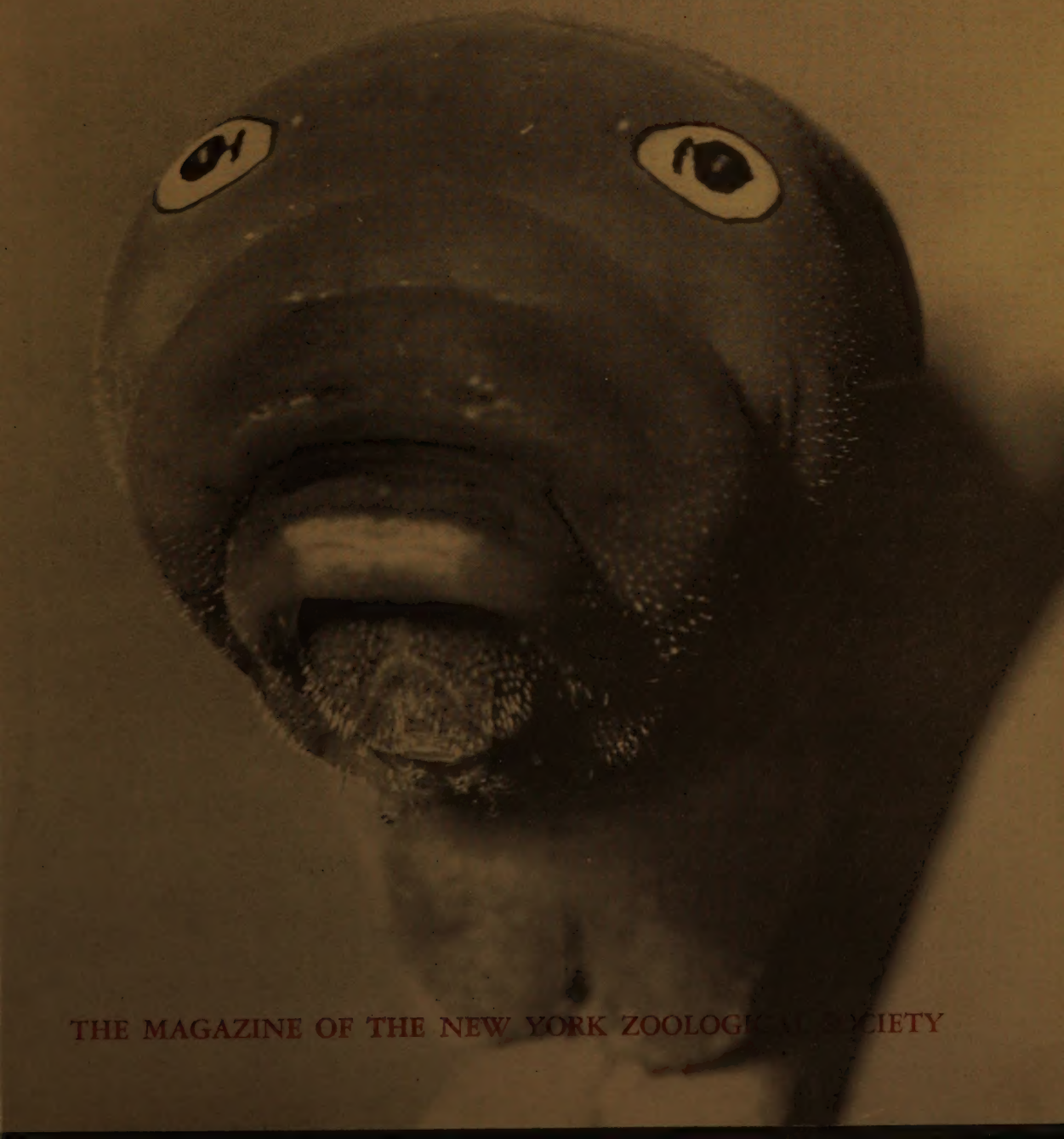
ANIMAL KINGDOM



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ANIMAL KINGDOM

BULLETIN OF THE
NEW YORK ZOOLOGICAL SOCIETY

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Jackson Hole Dream

EVERY NOW AND THEN a dream will come true. One did on a recent summer afternoon—July 19th, to be exact – in a valley beneath the feet of the glorious Teton mountains. This day marked the formal opening to the public of the Jackson Hole Wildlife Park, in the creation of which our Society has had the opportunity of taking an active part. The scene was one of rare beauty. In the foreground lay a large level meadow or plain upon which grazed a herd of buffalo and a small band of elk, and just beyond flowed the Snake River, one of the most beautiful of water courses. In the background towered the majestic snow-touched mountains.

Why this new enterprise, referred to elsewhere in these pages, and what is the fabric of this dream that has now become a reality? Essentially the Wildlife Park's motto might well be, "Let there be a greater understanding of primitive places and of the miracle of living things of all and every kind that make such places their home." Or, coming nearer to the tangible and the immediate, let us say that here is a place where the layman and the scientist, each in his own way, may observe and study the animals of this incomparable region and the environment that makes their existence possible. People from every part of our own country and from many foreign countries will come to look and wonder. Even now, scientists and student groups from 14 universities and scientific institutions have taken part in the field research programs that have already been organized. May the place make rich and significant contributions to our comprehension of the living world around us. Though seemingly its master, we cannot truly exist if we are deaf to its messages.

Fairfield Osborn

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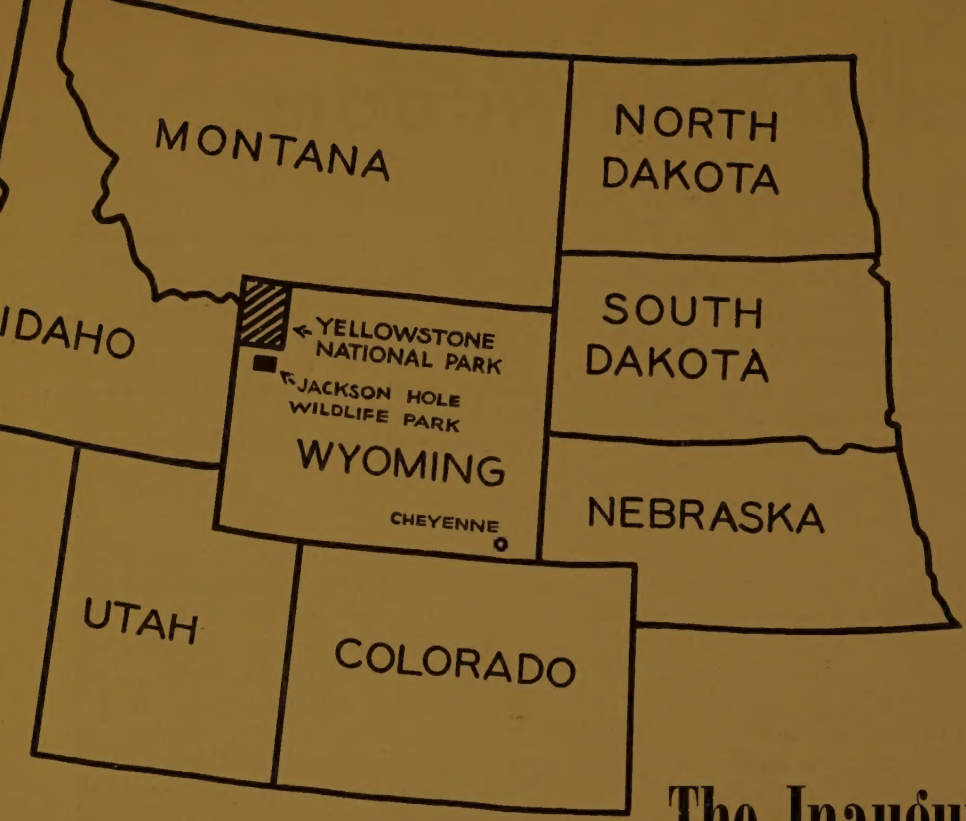


The Inauguration of Jackson Hole Wildlife Park

THE JACKSON HOLE WILDLIFE PARK at Moran, Wyoming, was dedicated and officially opened to the public on July 19, after three years of planning. As the prime mover in its creation, the Zoological Society is entitled already to feel a glow of satisfaction, for the Wildlife Park has started off with every evidence that it is going to be a great success.

It is America's newest Park — and unlike any other Park in the United States because it makes a direct attempt to interest its visitors in wildlife conservation by showing them, under natural conditions, the animals that Americans are being asked to preserve, and because it also operates as a biological field station for the Rocky Mountain area. Students from 14 colleges and universities worked on research problems in the Wildlife Park this summer.

The Park comprises 1,500 acres of extremely varied land — stands of lodgepole pine, sedge-bordered ponds and marshes, sagebrush slopes, groves of quaking aspen and flat grasslands through which wind the Snake River and its backwater. The land was made available by John D. Rockefeller, Jr., and Laurance S. Rockefeller through Jackson Hole Preserve, Inc. In the sponsorship of the Park, the Zoological Society is associated with the Preserve and with the Wyoming Game and Fish Commission.

Four hundred of the 1,500 acres are under fence to make the initial herds of Buffalo and Elk easily observable by tourists, and there are other herds of Moose, Mule and White-tailed Deer and Pronghorn Antelope in the Park.

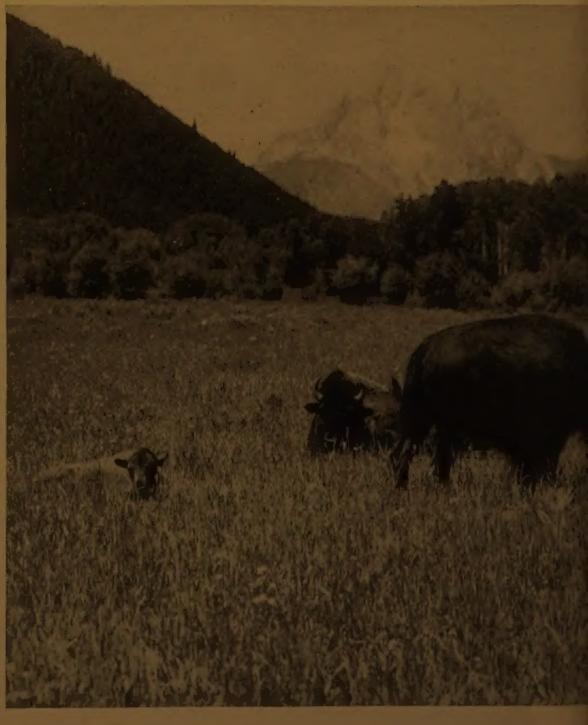
Wapiti in the Wildlife Park as visitors see them —apparently at complete liberty but actually kept within view by almost invisible barriers.

Laurance S. Rockefeller made one of the dedicatory addresses. Other speakers were (left to right): Lester Bagley, Wyoming Game and Fish Commissioner; Fairfield Osborn, president of the New York Zoological Society; Carl Jorgensen, president of the Wyoming Game and Fish Commission; Charles Moore, president of the Wyoming Dude Ranchers' Association; the Hon. Lester C. Hunt, Governor of Wyoming; and James R. Simon, Director of the Jackson Hole Wildlife Park.

Research facilities in the Wildlife Park center in this simple but adequate building of lodgepole pine. The laboratory was used by students working at the Park all this past summer.

This is the setting of the Wildlife Park. It occupies the foreground and center of this scene, with Jackson Lake and the Grand Tetons beyond. The river is the appropriately-named Snake.

LEFT. When these Prairie Falcons grow up, they will become mighty hunters of wild rodents.



RIGHT. Bison at ease in the meadow, with Mt. Moran looming snow-covered beyond them.

LEFT. A sprightly Chipping Sparrow has just been attending to the food requirements of her brood, only recently out of the nest.

RIGHT. "The Bum," a tame Mule Deer that always comes up to be photographed by Park visitors.

Moose are to be seen in the Wildlife Park at almost any time of the day. This is a youngster that came down to one of the many ponds and areas of still, shallow water in the Park, where Moose love to feed and rest.

Feeding the Fishes

By JAMES W. ATZ

THE new South American Lungfish turned out to be a problem. Although it had apparently settled down in the exhibition tank alongside its African relative, it had so far refused to eat. Almost three weeks had passed since it had made the long air trip from Brazil to New York, and the Aquarium's crew was beginning to worry. Fasting for a month or more does not harm some fishes, but there was no telling how long our lungfish might have been starved before we received it. Moreover, it *looked* hungry – to Curator-Aquarist Coates and Tankmen Bloom and Howley, who are versed in such esoteric matters as knowing how a fish feels by the way it looks and acts.

In this instance, however, the fish's actions seemed to belie its appearance, because foods that had been readily taken by numbers of predecessor-lungfishes interested it not at all. Horse heart, cut into strips and dangled alluringly be-

fore its nose or left quietly lying nearby, evoked no response whatsoever. Nor was raw fish, either cut or whole, enticing. Even earthworms, prime favorites with most lungfishes, were only briefly tasted and then rejected and ignored. What next to tempt this too fastidious fish? Perhaps something alive and mobile would appeal to it. A small goldfish was put into its tank, but several days later the goldfish was still swimming about, unmolested. Finally someone suggested that a crayfish be tried and one was borrowed from the crayfish supply tank, kept at the Aquarium for the Duck-billed Platypuses. Next morning the crayfish was gone. Very soon the lungfish ate another and from then on there was no more trouble. It was not even necessary to continue to feed crayfish, for once its appetite was stimulated, our lungfish readily took the more ordinary — and less expensive — foods that it had previously refused.

The task of titillating a lungfish's palate is only one of many that might confront those who maintain a large and varied collection of living fishes.

e Zebra Fish from the Indian Ocean normally other fish, alive, but in captivity they can be ght to accept other food, such as bits of clam ch an attendant is offering to these specimens.

The feeding of each new specimen is likely to be a problem, to be solved by previous experiences with similar fishes, by knowledge of habits in the wild, or, if all else fails, simply by trial and error. At the New York Aquarium the weaning of fish from their natural diet to a practicable artificial one is so routine that definite procedures have been worked out. For example, by repeatedly dropping bits of raw fish in front of their snouts, hungry Electric Eels can usually be conditioned to take this substitute for the living fishes, frogs and the like on which they subsist in nature. They are accustomed to electrocute their prey and in captivity they never learn that it isn't necessary to shock the dead, artificial food before swallowing it. Patience and perseverance are prerequisite for the job of weaning an Electric Eel. Curator Coates states that in general not until three meals of artificial food have been taken can any new fish be considered fully conditioned or "broken in."

Some fish, however, never learn to take the substitutes offered them in captivity. No Leaffish, for instance, will eat anything but living fish, and only one out of scores of Pantodon, the Freshwater Butterfly Fish, will ever take anything but live insects.[1] (We feed ours on cockroaches). Yet it is surprising how many species *will* adapt themselves to the artificial diets of public aquariums. Among these are some of the most savage fishes known and the most dangerous to man. A school of blood-crazed Piranhas can skeletonize a 400-pound hog in ten minutes, but in captivity they are content with pieces of plain raw meat. Barracudas are often called the tigers of the sea and in nature apparently feed exclusively on other fishes — with an occasional attempt to tear apart unwary human swimmers. Once confined in a tank, though, they become quite docile and can be taught to eat dead fish in place of live ones. The last Barracuda we had was so tame that it refused to chase living prey and would eat chopped fish and clams only from the Tankman's hands.

Nature spreads a bountiful table for fishes, offers an enormous variety of food objects. We who must set the table in captivity cannot be so lavish. What aquarium could provide its hungry exhibits with hundreds of kinds of living fishes, with sea-squirts, starfishes, sea-urchins, moss-animals, squid, clams, oysters, mussels, snails, insect larvae and adults, crabs, lobsters, shrimp, worms, jellyfish and coral — to say nothing of myriads of almost microscopic animals and aquatic plants of all sorts? Even if all these *could* be collected, the cost of doing so would be absolutely prohibitive. Fortunately, many fish are not "set in their ways" as far as feeding habits are concerned. What the aquarist does is to develop a few practicable, basic rations that will satisfy the majority of his charges and then modify and supplement those rations to accommodate the more intransigent feeders that have enough "exhibition value" to warrant the extra expense and attention.

A basic diet for small, tropical freshwater fishes, which comprise the majority of our present collection in the Lion House, was devised many years ago by Curator Coates and consisted of a mixture of raw whole fish, beef heart, clams, shrimp and lettuce, all chopped up very fine. This mixture is still used today except that horse

heart has been substituted for beef heart and the shrimp omitted and fed separately as a dried powder. In the old days preparing these ingredients meant literally hours at the chopping board, but in 1941 Dr. Myron Gordon discovered that a new type of cocktail mixer was just the machine thoroughly to mince up these substances.[2] Now Tankman Bloom pours some clam juice into his mixer, adds small pieces of meat, fish, clam and lettuce and in a minute or two has a finely minced mixture which he then thickens with Pablum until it becomes a rich, buff-colored, paste-like substance. It must be extremely tasty to piscine palates, if the avid way our fishes eat it is any indication.

This composite food is fed to the smaller fishes twice a week – doled out carefully so that no excess remains to foul the water in the tanks. Live food, usually "Tubifex" worms, is given between meals, and once a week the small fishes get powdered dried shrimp and salmon eggs. Larger fishes are fed according to their size and appetites, some every day, others as seldom as once a week.

A complicated regimen like this insures that a wide variety of proteins, minerals and vitamins will be available. It is necessary because fishes are susceptible to dietary deficiency diseases just as man and other animals are. Vitamin A and various elements of the vitamin B complex have been proved essential to growing trout; it is assumed that they are also needed by other fishes.[3] In trout, lack of iodine will cause a condition very like goiter, and an excess or deficiency of other food stuffs can bring about fatty degeneration of the liver.[4] But the science of fish nutrition is hardly begun and to the aquarium man the feeding of his charges must still be largely an art, even though he suspects that his diets are far from perfect.[5] All he can do is make his prepared foods as complete as possible, within practical limits, and in addition provide as much and as varied live food as is feasible. At the new New York Aquarium we hope to have facilities and space for raising small fish, mosquito larvae, blow flies, cockroaches, freshwater fleas (Daphnia), brine shrimp, earthworms, dwarf tubificid worms, white worms and infusoria.

Yet even all these will not be enough! Our quaint seahorses will want *Gammarus* (tiny relative of crab and lobster), and our colorful parrot fishes will need green sea lettuce, *Ulva*. These foods cannot be cultured — they must be collected at the seashore. Indeed, the Collector for a public aquarium probably spends more of his time getting natural foods for the exhibits, than he does in collecting the exhibits. Armored catfishes and some other freshwater species must have at least a modicum of algae to remain healthy. Snails are important for fish like the freshwater puffers.

Special techniques in feeding will be necessary too. Seahorses and Celestial Telescope Goldfish should be fed by hand to insure that each specimen gets its share. A tankful of vicious Green Moray Eels requires extra care in feeding to prevent quarreling over the food and the often fatal fights that follow. Fishes that "browse" in nature, eating more or less continuously, want to be fed often, perhaps several times each day. Puffers, for example, will not live long if fed only three times a week, but thrive if fed at least once a day.[6] Caution must be exercised in feeding the gluttonous Frogfish and Sargassum Fish, since these forms never know when they have had enough and will actually eat themselves sick.[7] The Zebra Fish (*Pterois volitans*) will even eat so much that it dies of indigestion.[8]

A recent development in the study of nutrition in fishes is the clear-cut demonstration that their coloration often depends directly on the kind of food they eat. Like the Zoological Park's flamingos, some fishes require special foods or they lose the bright colors they exhibit in nature. The brilliant red and yellow of wild trout disappears in captive specimens that are fed the usual hatchery or aquarium diets. Except for the loss of color, however, the fish are apparently perfectly healthy and when they are given such natural foods as waterfleas and aquatic insect larvae, they retain their beautiful colors. It would be practically impossible to obtain enough of these minute creatures to feed even a few good-sized trout, but fresh salmon eggs have been found to provide the necessary material to build up a trout's bright coloration.[9] Perhaps a satisfactory and practicable diet, consisting of quick-frozen salmon eggs (obtainable at hatcheries) and waterfleas (cultured at the Aquarium) could be worked out. Among marine fishes similar phenomena occur. The dapper Beau-gregory loses its bright yellow when fed only on animal matter; the fish must have a certain amount of marine vegetation to maintain it.[7] Here is a challenge to the aquarist: can he take advantage of these newly learned facts to improve and beautify his exhibits?

Challenging, too, are those fishes with peculiar feeding habits never yet exhibited in public aquariums. How do the long-nosed Elephant Fishes employ their decurved, tubular snouts? How does the silvery Biara (*Hydrolycus scomberoides*) feed — with canine teeth so long that its mouth must open to at least a right angle before any food can get into it? How do the blood-drinking catfish of South America do their phlebotomizing? Perhaps some day we shall learn the answers to these questions by observing these rarities feeding in the tanks of the new Aquarium.

And perhaps we shall some day exhibit those dietetic anomalies, the fruit-eating fishes. In Brazil the Indians go fishing for the Pacu with bow and arrow. They wait under a fruit tree on a river bank and shoot the fish as it comes to the surface to strike at falling fruit. Where agriculture has destroyed the shore-lining fruit trees, the Pacu has disappeared.[10] In Thailand the Pla Tepo, a large catfish, is much esteemed as food, and the Siamese raise it in ponds. They feed it on many kinds of fruit and vegetables, but its favorite food is bananas.[11]

All fish-feeding jobs are time-consuming, but if the day ever comes when we exhibit a Pla Tepo, we shall have to remember to allot the Tankman a little extra time for peeling bananas for our banana-eating catfish!

A perfect instrument for mixing food for fishes is the Waring Blendor, an electric cocktail mixer. Tankman Bloom is combining clam juice, lettuce, meat, fish and chopped clams.

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Souvenirs of Ceylon

By DILLON RIPLEY

Fellow of the New York Zoological Society,
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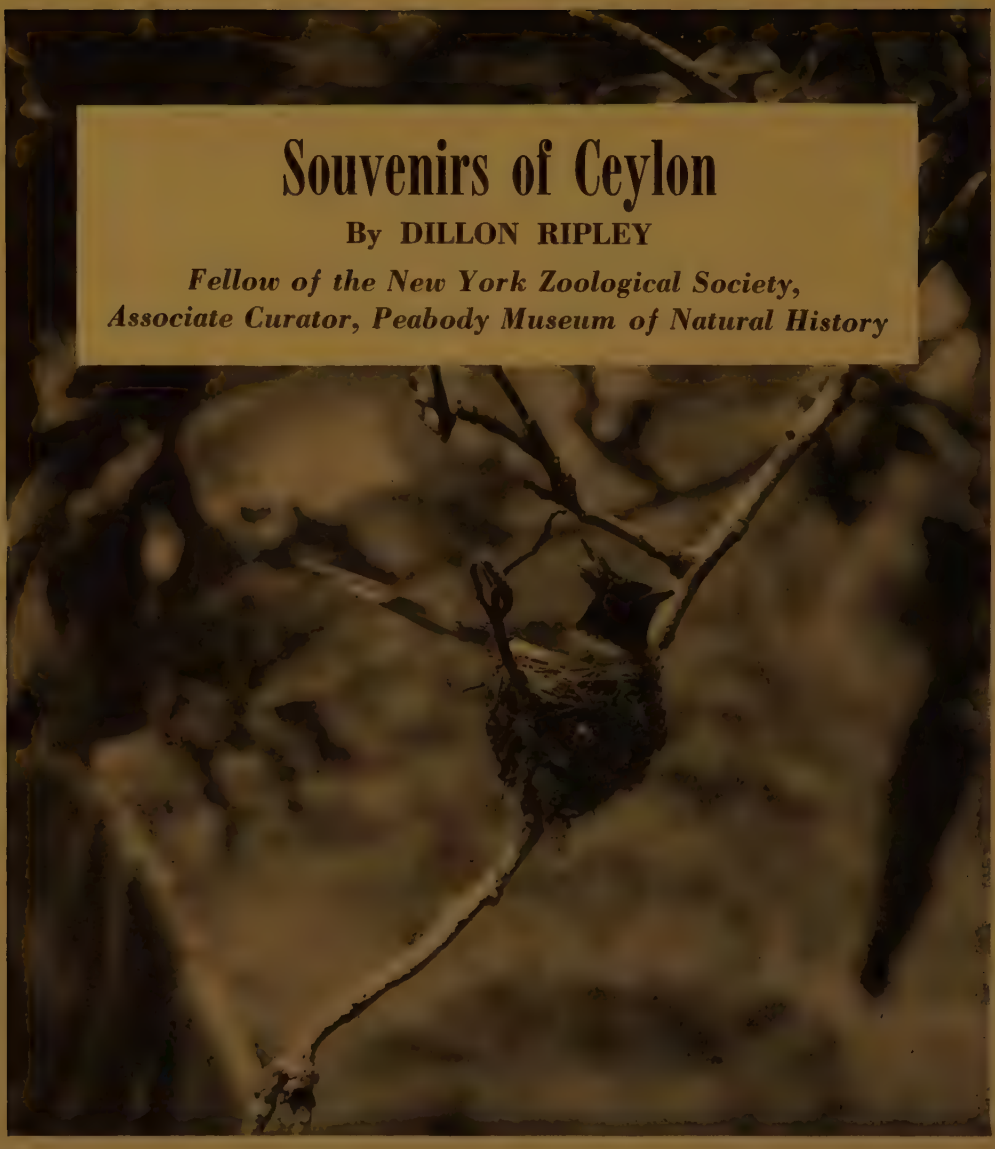


Certainly the most beautiful bird of Ceylon is the aptly-named Paradise Flycatcher. Here she has built her dainty nest of cobwebs and grass in the fork of a slender, swaying branch.

ONE OF THE PLEASANTEST THINGS that happened to me during the late unlamented War was to be stationed for nearly two years in southeast Asia with headquarters in Ceylon. Besides being one of the really beautiful islands of the world, Ceylon boasts a multitude and variety of birds, most of which I had never had the luck to see before. Even during my first few days in Colombo, a pleasant but definitely citified town, I began to see strange birds.

My favorite time in Colombo was the late afternoon. Then the heat of the day faded with the light. The town has lovely gardens full of flowering plants, crotons, bougainvillaea, cannas, orchids, various cassias and flamboyants, and large glossy-leaved trees like the cashew. Through all

of this riot of color wanders a profusion of birds. Nearly every garden has its pair of barbets. There were two principal kinds in Colombo, of which the commonest is the Green Barbet. This is a bright green nine-inch-long fellow with a faded yellow-brown head, large stubby reddish bill and prominent staring eyes. Its call is a loud rolling series of "tock" noises, very penetrating and monotonous. Barbets are distantly related to woodpeckers and like them bore holes in the softer wood of dead trees in which they make their nests. They fly with a lot of rather inefficient flapping of short round wings in a swooping way like woodpeckers and they land on the side of a tree with a distinct thump sometimes. The whole performance, the staring eyes, the strange attitudes, the gawky appearance, makes one feel that the barbet is a sort of survival, a relic of an earlier age which has just managed to cling on for dear life to the twentieth century. And yet barbets really manage quite well in spite of their clumsiness and have invaded tropical cities quite as successfully as the sleek robin at home.

Then there are the sunbirds of which the commonest is the Purple Sunbird. They are about the size of a small warbler, with curved thin bill. The male is all over blackish-purple, with two small tufts of bright yellow feathers on the flanks. They buzz about such flowers as the hibiscus almost like hummingbirds and they have a surprisingly sweet, clear, finchlike song. The female is rather inconspicuous and mousey, a rather olive-greenish color above and subdued yellow on the underparts. The males are very bold in contrast. I saw one join in a frantic chase that was going on in a backyard garden when a small hawk invaded the place and carried off a young thrush. The commotion was terrific, and in the van of the pursuit was a male sunbird which evidently had a mate and a nest near-by.

Babblers are strange birds, common to Africa and the East, but not really found in our New World. The commonest babbler in Ceylon is one called the "Seven Sisters," always apparently a plural name. The reason is clear for this ubiquitous bird invariably goes about in flocks of some number near seven. It is about the size of a robin, pale mouse brown in color, often very worn and almost whitish on the head. The whole group moves along continuously, now low on the ground, now higher in some low bush, and all the time keeping up a tinkling rather musical chatter among themselves. As they hop about they droop or pick up their wings, flirt their tails back and forth, all in an agitated nervous way. Possibly the sight and sound of their behavior helps to keep the flock together. It may be a sort of semaphore and wig-wag system. Every so often the whole flock will fly into a tree, much higher than usual, and here they will all set up a great deal of calling in loud, strident voices. When loud, their calls lose all musical pitch and become simply discordant.

But the most surprising backyard birds to me were the kingfishers. The usual one to see is the White-breasted Kingfisher, a bird almost as big as our North American kingfisher with a blood red bill, dressed in chocolate brown, blue and white. These birds have an unexpected habit of flying down into a vegetable patch and scrounging about for beetles or grubs exactly as a thrush would at home. The other kingfisher is a little blue gem, a tiny thing with blue-and-black laddered back, fawn breast and white throat. It seems to buzz about more like an insect than a bird and when it suddenly plunges straight down into a pool of water, it seems as if any fish below could easily devour it, rather than the other way about.

A little pale brownish-gray owl, called the Scops Owl, was also ever present. Just after sunset it would fly by, as silently and dextrously as a bat. Sometimes it flew into verandahs at night, apparently in pursuit of insects, and occasionally became enmeshed in mosquito netting. A pair nested in a hollow tree in a garden where I often sat. Their call was very soft, a single note, almost like the squeak of a shoe, a soft and shivery sound.

The most amazing things about Colombo are the sunsets. I suppose it is the humidity, but the whole atmosphere seems to exude a pinkish, sometimes a rosy, or again a yellow haze. It is not just the sky overhead or the clouds piled high in tumbled masses which are colored. The whole air sweated color from every pore. Even people's faces seem tinted by it. In this strange gilded world, the town of Colombo relaxes. Then is the time of walking abroad, the promenade.

W. W. A. Phillips Photo

The Yellow-browed Bulbul is essentially a jungle-dweller. Its nest is composed of twigs and grass and usually is suspended by the rim to a fork in the top of a thin sapling.

For the Europeans it is a ritual, performed in shorts or walking skirts, with a stick and a brace of dogs on leashes. For the Singhalese there is less conscious informality in clothes. And for the birds and the bats there is the same ritual. The giant fruit bats come out at this hour, leaving their daylong roosts and flying in soundless solemn procession in long trailing lines across the sky, seeking some fruit garden where they can settle down for a night's feast. The crows and the egrets, on the other hand, are going home to roost. Often the streams cross. The birds fly like the bats in long uneven strings, but almost always in groups going to some communal roosting place.

Out in the country my principal pleasure was to drive by one of the tanks, as they are called; reservoirs of water; man-made with earthworks on at least one side. Some of these tanks cover hundreds of acres, and if a small boat can be secured, are fascinating to explore. A friend and myself borrowed a small collapsible boat from an Army unit and went paddling in one of these large shallow lakes. All sorts of birds abound, especially in the occasional groves of dead or half-dead drowned trees that dot these places. Here are the roosting places of egrets, and their nesting places, too. At the right season it is a fantastic sight to see storks, ibises, cormorants, herons and egrets by the hundred perched on every available bough or branch, gathered about their crude bulky nests from which peer gawky youngsters looking like badly-stuffed specimens in an out-of-date museum.

In the countryside many different birds may be seen, but it is often difficult to secure more than a glimpse of them as they dash across the road. The easiest to spot is the Paradise Flycatcher — aptly named, for it is the most beautiful bird in Ceylon. Both male and female have spangly dark blue-black feathers on the head and throat, and the male has quite a perceptible crest. The rest of the bird is pure white in the male, cinnamon brown above and gray beneath in the female. Both birds have long tails, but the male's is a huge affair with the two central tail feathers prolonged to a foot or more, so that the

effect is of two trailing ribbons dangling behind as it darts from tree to tree. Until a few years ago it was thought that these gorgeous white males were the only true breeding males, but recently it has been discovered that the white males are all migrants from India, and that the breeding males of Ceylon retain the henny or juvenile plumage of the young male which looks exactly like the female, cinnamon and gray, except that they develop long streamer tails. This seems to be a curious trait of birds which have settled in the tropics after moving there from more temperate climates where definite seasons occur. In a place where it is summer all year long, the male bird often forgets to put on all his bright feathers.

Before I left Ceylon I had seen practically every one of the two hundred and forty species and subspecies of birds found there. Sometimes it was not easy to see a new bird and sometimes in my eagerness I found myself in a complicated position. My most embarrassing predicament occurred at Kandy, the ancient capital of Ceylon, now a sleepy village which was resurrected during the War and turned into the Theater Command of southeast Asia and the headquarters of Admiral Lord Louis Mountbatten. I was quartered at an officer's mess and had quite forgotten that that particular afternoon was the one of the big cocktail party. After office, I went back to my quarters, a comfortable palm leaf hut on the end of one of the blocks of palm leaf buildings. In front stretched a strip of green lawn to the edge of a small hill which gradually fell off, far down to a road below. On the slope were tea bushes, now growing rankly, and an occasional shade tree, a small *Albizzia* perhaps twenty-five feet tall. Just as I was shaving, clad only in a skimpy bath towel, I saw a shape come swooping over the tea and make for one of the *Albizzias*. From its flight I realized it must be a woodpecker — but which? That was the question. Frantic with curiosity, I rushed out of my hut and down the slope, small-bore collecting gun in hand. I had more than a suspicion that it was the small green woodpecker which I had not yet seen nor secured for my bird collection. It was; and I took aim and fired. At that, the bird fell and so did my towel. Hastily clutching my towel and retrieving the dead bird, I turned about, only to realize that I had been vaguely conscious of a hum of conversation, which had stopped. Silence reigned as the fifty or so officers, civilians and assembled ladies of the cocktail party craned and peered over the edge of the tea bushes at this extraordinary apparition. My face was so covered with shaving soap that I suppose they never did notice whether it was red!

Some day I would like to go back in peace and quiet and revisit the birds of Ceylon. I know no prettier or more fascinating group of inhabitants anywhere.

Kingfishers are "backyard" birds in Ceylon. This is the common species. Sometimes they fly down into a garden to search for beetles and grubs—very much like our familiar robin.

W. W. A. Phillips Photo

Our Anima
In Bel

IN HUMAN SOCIETY, "pulling strings" is a roundabout way of getting special favors. In a very literal and direct way, pulling strings paid off in grapes, apples, cherries and other delicacies to a selected group of animals in the New York Zoological Park this summer.

For the second successive summer we have financed a team of animal behaviorists who are exploring the desirability and feasibility of long-term psychological and behavior research among our Zoo animals. Some of their experiments concerned the ability of animals to choose between two solutions of a problem and to make discriminations involving vision, hearing or other senses. Other tests were of motor skills and patterns of individual and social adjustments.

On the margins of this and the next page are the 20 different ways in which strings were arranged in one test. The white circle at the end of one line in each pair represents the reward of food to be gained by pulling that string.

Learning and perception can be demonstrated by a tabulation of the successes and failur
So, to a certain extent, can "handedness"
in regard to several of the test animals. Bu
are "brighter" than others in the quickness
ward-string and the blank one, are fascinat
must await publication in *Zoologica* and o

A Guinea Baboon pulls the wrong string in an "X" test pictured at the top of the opposite page. Grapes were the reward. Dr. Riess arranges the test while Dr. Ross records the results.

***A Mexican Violet
choice among food
ored (Left to Right)***

ull Strings"
r Tests

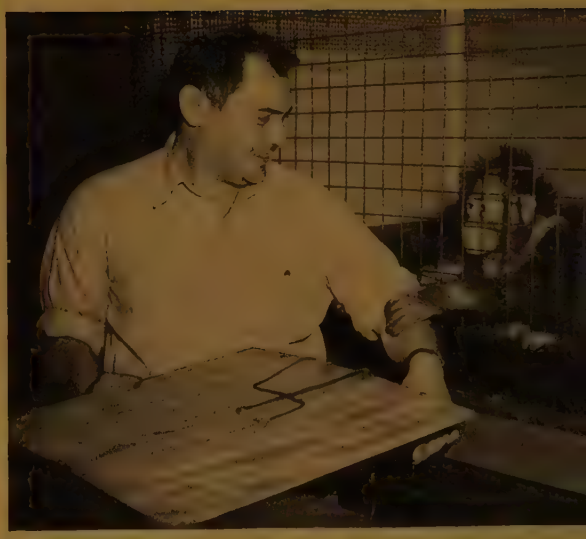
ls that pull the strings in hundreds of tests.
ual use of right hand or left hand — be stated
es are habitual southpaws, and which ones
h they learn to distinguish between the re-
that cannot be recounted here as yet. They
al journals.

The animal behaviorists have been interested in developmental sequences, as exemplified by the various stages in a baby Sealion's ability to swim; in vision and the ability to distinguish between colors of various shades and intensity in birds, in social behavior of groups or "societies" of animals, and in family organization among animals. The preliminary results look good; it may be that we have here, in the Zoological Park, a virtually unexploited laboratory for behaviorists and comparative psychologists.

The summer studies were under the general direction of Dr. C. R. Carpenter of the Psychology Department of Pennsylvania State College, and the immediate supervision of Dr. Bernard F. Riess, assistant professor of psychology, Hunter College. Working with Dr. Riess were Dr. Sherman Ross, associate professor of psychology, Bucknell University; Dr. Herbert Birch, assistant professor of psychology at City College; and Samuel B. Lyerly, instructor in psychology at the Pennsylvania State College.

ningbird makes its
at are variously col-
lue, Green and Red.

Luck or skill? An Asiatic Elephant chooses the string that leads to an apple, which was always concealed under the dark-colored patch on the box. Mr. Lyerly records a success.



LEFT: Dr. Birch makes friends with Andy, the Orang, preparatory to tests. ABOVE: Andy would rather play than work in tests.

Testing the reactions of the Gibbons to recordings of their own calls, Dr. Ross rows Dr. Riess and a phonograph within a short distance of Gibbon Island. The male comes down to listen.

o Dr. Birch's obvious disappointment, ndy has chosen the wrong string and fails is time to collect his reward of a grape.

Progressing from string-pulling to the use of simple tools, Andy is given a stick with which he soon learns how to reach a cherry.

Doruma, one of the young African Elephants, was given a few tests but she was very timid about approaching the strange contraption and was always inclined to back away. Here, anyway, she chose the string with an apple.

The Jumper

YESTERDAY AFTERNOON, right in the middle of our peaceful jungle, one of our top laboratory assistants suffered a nervous breakdown. His eyes are big and black above an incongruous orange mustache, and when the crisis hit him, he switched them wildly back and forth, spun around in circle, and then headed in great leaps for the nearest laboratory window. He has not been seen since. Although a reward has been offered for his recovery, we are not very hopeful, since he stands only a quarter of an inch high, and the Venezuelan jungle is rather tangled here at Rancho Grande.

He is known as X51, which, instead of signifying an FBI agent, means simply that he is the fifty-first specimen of the jumping spider, *Corythalia xanthopa,* to be used in experiments this year. Thanks to him and his fellows, we have had numerous lively sessions trying, in the most scientific way possible, to find out the whys and wherefores of their astonishing appearance and behavior. We want to know why some jumpers are bright red with turquoise blue, others a striking yellow and black, and still others an uninspiring brown. We want to know why some have fractious crests of carrot red standing straight above their eyes, and others black fringes of silky hair along their agile legs. And finally, we want to know the evolution through the ages of their courtship dances and, what is even more baffling, the meaning of their ritualistic "battles" with rival males, as complex and stylized as the duels of Javanese dancers.

Comparisons of animal behavior with the quirks and foibles of human beings are always dangerous. You lay yourself open at once to protests from fellow scientists who accuse you, in all justice, of sentimentality and anthropomorphism. Nevertheless, anyone who has once looked a live jumping spider in the eye under the microscope will never again, deep inside himself, feel scientifically detached about a jumper. It is one of the most unnerving experiences in the world, especially if the spider is a green-eyed *Lyssomanes.* Although his "head" is so firmly joined to his midriff that it lacks a separate existence, the whole front half twists so gracefully on his legs, as he peers up at you, that his air of poised atten-

tion is not only comically obvious, but downright dismaying in one so small. A conversational interview seems very much in order, and we should be able to ask him outright the personal questions that are puzzling us. I have always been privately certain, however, that, if only we could find a common language, it would be the jumpers who inevitably would ask the questions.

Rancho Grande

By JOCELYN CRANE

Meanwhile, we employ various ruses in order to learn about their private lives. For example, the eyes of *Lyssomanes* are not only green, but they change sometimes, both separately and together, to jet black. The spider sits perfectly quiet on the microscope stage, yet, as he looks up at you, a black curtain inside his right eye swings slowly into place, and suddenly he has one very literal black eye while the other stays a limpid emerald. Then the left eye shifts, and, at irregular intervals, both are black or green together. Since each eye is set off with a frame of shiny white hairs from the rest of his green body, the general effect is decidedly startling. In order to find out a possible function for these rolling eyes, we introduced an especially lively *Lyssomanes* to a potential mate on the broad top of a laboratory table.

At first the results were disappointing. Instead of the typical, energetic, jiggling dance I had expected, the suitor just sat. There appeared to be nothing wrong with the female, who was young and presumably attractive. Yet the *Lyssomanes* went on sitting. Occasionally he exerted himself to rise on tip-toe and extend a languid leg or two in her direction, but he soon settled back into stodgy inactivity.

Suddenly, however, it dawned on me that the female had not moved for five minutes, and that she was gazing at him in what can only be termed tense fascination. I crept slowly around to the far side of the table, and kneeling on the floor, looked at him from her viewpoint and level. There was from that moment no more doubt: His eyes were changing from green to black and back again at a frantic rate of speed. By the time I came round the table once more and looked with new understanding at the female, I realized she was putting Carmen Miranda's best efforts to shame. And that was one laboratory story that ended happily, for at this moment seventeen tiny green-eyed *Lyssomanes* are thriving on my desk.

Another problem we are trying to solve is the use, if any, of the various colors of the jumpers. Does a *xanthopa's* normally yellow mustache help him to win a mate or vanquish a rival? It seemed that the best way of settling the problem was to change the color and watch results. By trial and error we have worked out a system for inflicting painless disguises on unsuspecting spiders. The victim gets a quick whiff of chloroform and then, while held gently in a wisp of cotton under the microscope, he is given a completely new "make-up" with a tiny paintbrush and opaque water colors. Within a few minutes the spider wakes up, shakes himself a bit, and starts moving about. Within an hour or two he is usually courting and fighting with all the enthusiasm of his unpainted brethren. After some of my more striking efforts — for instance, the time I metamorphosed a plain black female into a jade green siren with touches of amarynth pink — I have felt cockily sure that bumbling old Nature had been surpassed.

However, the surprising result of all this has been that, in courtship, neither sex takes the slightest notice of my transformations. So long as the female is approximately the right size and shape, wiggles now and then, and has the odor proper to her sex and species, the male will find her glamorous, regardless of her appearance. Similarly, no matter what the color of a male's mustache — its normal yellow, or instead, red,

blue, purple, orange, green, gray or white – the female does not mind. Even when I deprive him of it altogether, gently shaving off the golden hairs with my finest scalpel, it makes no difference to the female. So long as he prances in the proper rhythm, rocking now and then from side to side, she will, in time, accept him gracefully.

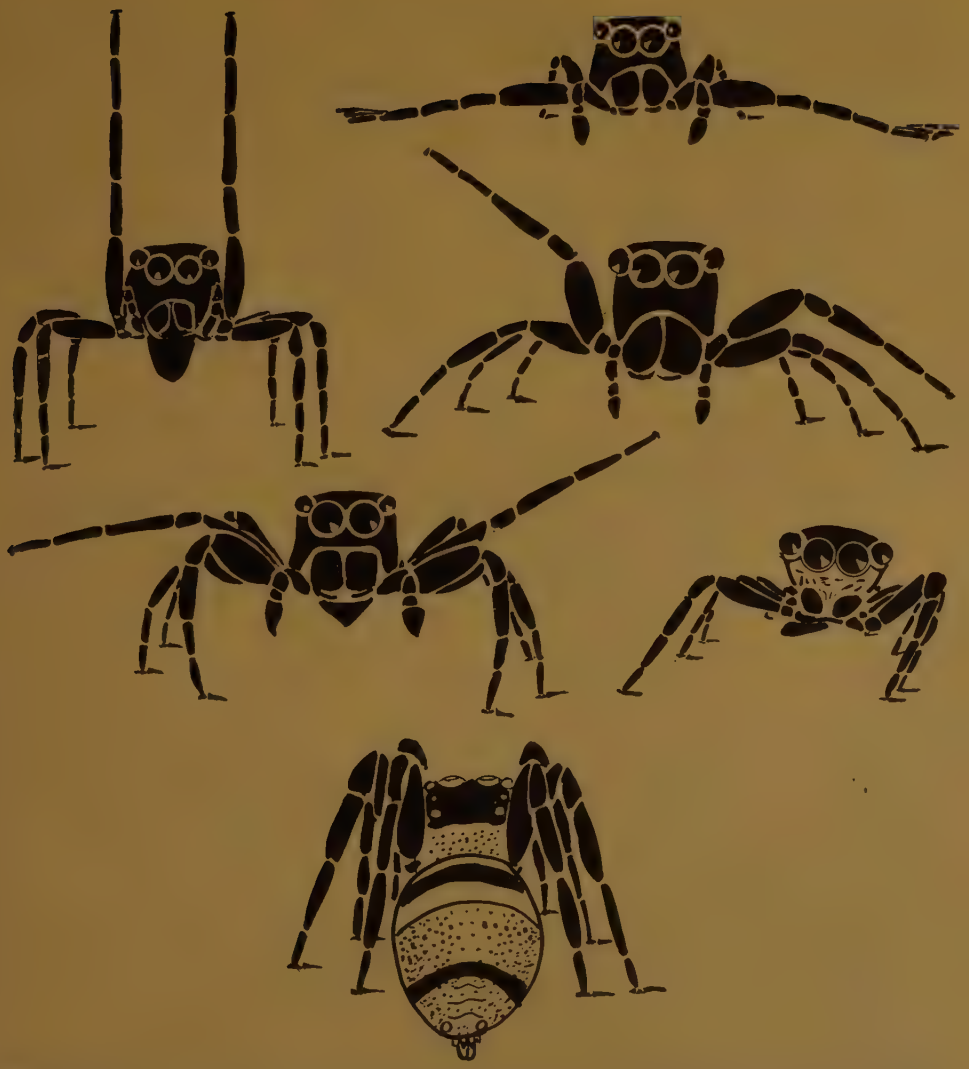
However, fortunately for our pet general theories of adaptation and natural selection, the yellow mustache has turned out to be an important badge of masculinity in the encounters between males. Battles in the *xanthopa* clan are all a sort of civilized bluff. Opposing males go through bloodless posturings, raising their six hind legs in a beautiful fan of poised fringes when they meet a rival face to face. Males with their yellow mustaches altered to orange or green were threatened just as were normal ones. But if the mustaches were altered to any other color– that is, to a hue further from yellow on the spectrum – the normal spiders either disregarded the monstrosity or treated it to a courtship dance. That happened, however, only so long as the painted male was still groggy from chloroform. One of the most amusing sights of the month was the apparent startled consternation of a normal male when the black-faced creature he had been energetically courting suddenly woke up and gave him a perfectly masculine threat display. The normal jumper at once stopped courting, and stared motionless at the horrid sight. Then he promptly turned tail and hid behind the microscope.

An especially interesting discovery has been that jumping spiders have "down" days as surely as human beings. Males, on their bad days, sit dully in the dumps and show no interest whatever in either courtship or combat. Females who on the preceding day were politely attentive to courting males and of peaceful disposition generally, turn overnight into savage-tempered viragos, leaping at their small suitors with fangs unsheathed, or turning their backs so constantly on the hard-dancing swains that the latter eventually lose interest themselves. These moods recur, regardless of food, water, age or other economic and personal conditions in the life of the spider, and must be borne by the impatient experimenter with more or less philosophy. Anyway, as one of our staff has said, it is encouraging to know that even spiders get the blues!

The break-down of X51, mentioned at the beginning of these notes, was not caused by any mere periodic tantrum. X51 was in peak condition and a reliably normal personality. Except for his customary quota of down-days, he had breezed nonchalantly through three weeks of tests and several changes of color. At the moment, in fact, his mustache was a vivid orange. The unfortunate incident of the break-down occurred during tests to determine the value of two yellow stripes on top of the female's abdomen.

On the table lay the green oilcloth which is always used for determining distance reactions in our spiders. It is marked in black ink with a dozen concentric circles an inch apart. On the 10-inch line, which is about the limit of visual response in these particular jumpers, I placed two young females, about a third of a circumference apart. Each had molted to the adult stage only five days before and each was enjoying an up-day. However, while X18 flaunted the usual pair of yellow stripes, X32 had had hers black-

These are just three of scores of possible color shifts in the eye-region of a Lyssomanes jumping spider. The eyes change from green to parti-colored to black and back again. The change mechanism is little understood.



Five different kinds of Rancho Grande jumping spiders, all new species, at the peak of their various courtship displays. The fat spider at the bottom represents the general appearance of a typical female jumper. In this family, displays range all the way from a simple raising of two front legs to rather complex dances performed in a series of separate, distinct "steps."

ened out. In the exact center of the circle I placed good old X51.

He responded at once. First he caught sight of black X32, but at the same instant normal X18 wiggled, and he looked toward her. Before he had well started a courting approach-stance, X32 began grooming a leg, and his attention was once more drawn her way. This sort of thing went on for the next ten minutes, while the male approached along the midline between them, zigzagging first toward one, then toward the other. By the time he reached the six-inch circle, when their odor must have been reaching him strongly, his palps were flagging up and down excitedly. But still he did not choose to court one alone. Finally, at the eight-inch line, exactly mid-way between them, he stopped dead and looked from one to the other and back again, like the proverbial donkey between two bales of hay. And it was at this instant that he whirled around and jumped out of the window. I hope that wherever he is, he has found a placid niche among his fellows, orange whiskers and all. He has earned it.

Photo by Lynwood M. C

From Little Monster To Resplendent Beauty— That's the Tiger Swallowtail

By BRAYTON EDDY

THE GROTESQUE CREATURE at the bottom of this page (and on the cover of this magazine) is the caterpillar of the Tiger Swallowtail Butterfly, largest of our common butterflies.

The little monster that gazes so soulfully at the gorgeous butterfly that it will, in a few weeks, become, is not actually gazing at all — at least, not with the seeming "eyes" in the top of the thorax. These are simply greenish-yellow so-called eyespots, edged with black and enclosing a black-and-blue false pupil. In front of them are the openings for two fleshy orange "horns" which give off a nauseating odor when they are thrust forth. The true eyes are much lower down, on the head, in the vicinity of the chewing mouth-parts.

The Tiger Swallowtail on the opposite page will deposit its eggs one by one on the leaves of such trees as wild cherry, ash, poplar, apple and shadbush. In about ten days they will hatch and the caterpillars will reach the stage represented here in about three weeks. Then comes the tough-shelled chrysalis stage and from it emerges the resplendent yellow-black-blue Tiger Swallowtail — and the cycle starts all over.

Moulin Studios, San Francisco

These magnificent animals are representatives of the last surviving herd of Roosevelt Elk, now given protection in the Madison Grant Forest and Elk Refuge in Humboldt County, California.

The Madison Grant Forest and Elk Refuge

MADISON GRANT was one of the founders of the New York Zoological Society and in various capacities, as Secretary, Vice-president and President, he helped to form and guide it from 1895 until his death in 1937. Long ago the Society paid tribute to his share in the creation of this institution; a bronze bust of Madison Grant stands in the Zoological Park's Administration Building, and a portrait of him adorns the Members' Room.

Now another phase of his career, as Conservationist and lover of primeval forests, has been splendidly celebrated on the other side of the United States. In Prairie Creek Redwoods State Park, near Orick in Humboldt County, California, a redwood forest tract of 1,600 acres has been dedicated in memory of Mr. Grant, as the habitat of the last surviving herd of Roosevelt Elk in California. This magnificent animal, *Cervus canadensis roosevelti*, was named by Merriam, in 1897, in honor of Mr. Grant's friend, Theodore Roosevelt.

A commemorative dinner was held on July 29 in San Francisco, celebrating also the thirtieth year of activity of the Save-the-Redwoods League of which Mr. Grant was a founder. The Madison Grant Forest and Elk Refuge was established as a memorial by DeForest Grant, John D. Rockefeller, Jr., Archer M. Huntington, the Zoological Society, the Boone and Crockett Club, the National Audubon Society, the American Wildlife Foundation, the Save-the-Redwoods League and the California State Park Commission.

News from the Conservation Foundation

Fairfield Osborn Speaks on Town Meeting of the Air

SPEAKING TO THE TOPIC, "What Hope for Man?" Fairfield Osborn, president of the Zoological Society and the Conservation Foundation, took part in the four-man panel discussion on the Town Meeting of the Air in Washington on September 14. This symposium, held in Constitution Hall before an audience of several thousand, marked the closing of the centenary meeting of the American Association for the Advancement of Science. In the audience were scientists from all over the United States.

The other participants in this significant program were Dr. Brock Chisholm, director general of the World Health Organization; Dr. Harlow Shapley, director of the Harvard College Observatory; and Dr. Edmund W. Sinnott of the Sheffield Scientific School of Yale University. The discussion was broadcast over the ABC network. Prof. Stanley A. Cain of the Cranbrook Institute of Science of Bloomfield Hills, Mich., summed up the discussion.

Mr. Osborn said in part, as reported in the New York Times: "Hope for the future of man rests primarily therefore upon whether he realizes before it is too late that the maintenance of the earth's fertility is essential to his survival; further, that there is a limitation to the number of people that the earth is capable of supporting.

"As matters stand today, these two stark truths, never too clearly recognized in the course of human history, have been almost totally obscured by the dazzling triumphs of materialism and industrialization.

"We are bouncing radar beams off the moon at a time when we are gradually reducing our own world to the condition of sterility of that romantic planet. We have seemingly discovered the secrets of the universe but we have not as yet persuaded ourselves that we must adhere to the principles that ensure the existence of all living things, man included."

"Living Earth" Films Exceed Sales Expectations

It is perhaps too early to count our chickens, but according to the distributors, Encyclopaedia Britannica Films, Inc., the first group of four motion pictures produced and released by the Conservation Foundation – the "Living Earth" series – may sell far beyond the number originally estimated for this year. It is reported that the Los Angeles Board of Education for example has ordered some thirty-two sets, or 128 films, for use in the public schools there. For the benefit of those unfamiliar with the sale of educational motion pictures, this may be said to be an unusually gratifying order. It is to be hoped that the current short supply of film-making materials will not retard the distribution of this series.

C. W. Mattison of the Division of Information and Education, United States Forest Service, reports that the Living Earth Series was shown to the Forest Service in Washington on September 9 and 10, and he states that in his experience no set of films has received such unanimous favorable comment from all present. Mr. Mattison telephoned his congratulations to the Foundation on this achievement.

The Foundation's so-called Impact film, a condensation of the Living Earth series, will be ready for distribution this fall if working schedules can be maintained.

John Storer, the photographer of the Living Earth series, has thus far this year produced 10,000 feet of good film in preparation for the Living Forest series, the second group of pictures to be released by the Foundation at as early a date as possible in 1949.

Snider to be UNESCO Representative at Inter-American Conference

Robert G. Snider, administrative officer of the Foundation in charge of research, was appointed the official representative of UNESCO at the

(*Continued on Page* 159)

BEHIND THE SCENES

NEWS AND NOTES OF THE ZOOLOGICAL PARK, THE AQUARIUM AND THE DEPARTMENT OF TROPICAL RESEARCH

Tiger Reunion: Princess Rejoins Her Family

By LEE S. CRANDALL

INTEREST in young animals is paramount among Zoo visitors of all ages. We try, of course, to satisfy the demand but our greatest successes seem to have been scored with Tiger cubs. There may very well be more satisfying animal babies but if there are, we haven't yet produced them.

The birth of Dacca's three cubs on May 4, 1948, caused almost as much excitement as that of Dacca herself, with her two brothers, more than four years before. But curiosity had to be curbed until July, when the family made its appearance in the great outdoor cage at the north end of the Lion House. From the first day outside, mother and cubs established themselves as one of the most attractive exhibits we have ever had. As play grew more and more rough, Dacca often sought relief from infantile teeth and claws by leaping up to the cool rocks that form the background of the cage.

Soon after noon on July 23, Dacca dozed too long in a patch of sunshine on the cage floor. The cubs, tired of playing with each other, made a concerted rush at their recumbent mother. Dacca, startled from her half slumber, leaped suddenly to her feet, scattering cubs in all directions. Somehow, in the excitement, little Princess, the only female in the litter, was injured.

Examination by Dr. Goss revealed no apparent damage but the X-ray disclosed a "green stick" fracture of the left femur, extending nearly its full length. There was nothing to do but remove the cub to Mrs. Martini's nursery, where care and quiet would be assured. Healing progressed well and it was decided that on August 21 we should attempt re-introduction to the family group. Elaborate plans were made. The electric eel, just across from Dacca's indoor cage, a source of constant annoyance to the tigress, was temporarily blocked off. Neighboring animals were shifted to make plenty of room. Mrs. Martini was to

Herald Tribune—Fein Photo

Dacca and Princess Reunited.

carry out Princess, allow Dacca to see and smell her through the cage wire, then place the cub in an adjoining empty cage and let Dacca in. We thought Princess should be firmly established with her mother before meeting her brothers.

It was a lovely plan but like so many others, it didn't work. Little Princess, perhaps infected by our own excitement, had become so intractable that even Mrs. Martini was unable to quiet her. In a quick shift of plan, the cub was induced to leave her connecting cage in the Nursery and enter Dacca's den. From this, however, she firmly refused to budge, so that there was nothing to do but let Dacca into the cage and hope for the best.

The proverbial pin might have dropped, as we watched Dacca stalk through the opened door. She paused, sniffed and went directly into the den. After a few seconds of suspense, she came out again, her pace accelerated, in her eyes a

tigerish gleam of excitement. And rushing eagerly after her came little Princess, no longer conscious of the silent crowd, intent only on the mother from whom she had been separated so long.

It was a dramatic moment. Princess was obviously anxious to re-establish relations on the old playful basis, the only one she knew. Dacca, in her absence, had more than half convinced Princess's brothers that extreme familiarity was no longer permitted. It was evident that while Dacca would willingly accept Princess, there was a lesson to be taught first. To prevent the admonitive cuff, doors were quickly opened, leading to the outside cage where the brothers were waiting impatiently. Any fears we may have had never reached maturity, for little Princess was instantly part of a rolling, scrambling mass of baby tigers. When they finally untangled themselves, reconciliation was complete and Princess was again one of the family.

Department of Tropical Research Returns from Rancho Grande

THE Department of Tropical Research of the Zoological Society has just returned from its forty-seventh expedition after six months in the eastern Andes of Venezuela. For the third year William Beebe, Jocelyn Crane and Henry Fleming maintained headquarters at Rancho Grande, 3,500 feet up in the middle of a subtropical jungle. The main activities of the three seasons may be designated as first, exploration and preliminary study; second, collecting and observation, and third, intensive investigation of definite problems.

Among the latter several stand out: the wholesale migration of birds and insects through Portachuelo Pass, phenological study and record of the climaxes of blossoming and breeding of dominant floral and faunal types; comparative studies of jungle societies; and relations between instincts, sense organs and behavior in certain organisms.

Aside from these and other direct results of scientific study, several important by-products have come about in the field of inter-relations with the Venezuelans themselves.

Along the line of our constant hopes and endeavors, the President and Congress of Venezuela have at last passed a law setting aside Rancho Grande as an *Instituto Internacional de Ciencias Naturales.* The climax of this achievement is due to the energy and enthusiasm of Dr. Henri Pittier, the ninety-one-year-young dean of Venezuelan botany. The Department's laboratory, along with all the rest of the great Rancho Grande building and the surrounding untouched jungle in the *Parque Nacional de Aragua,* is now a biological station for the use of Venezuelan and foreign scientists and students.

The second thing in which the Department may take some pardonable pride is the translation and republishing of the elaborate "Ecology of Rancho Grande" by Beebe and Crane, as it appeared in *Zoologica.* This will now appear in Spanish as an entire number of the *Boletín de la Sociedad Venezolana de Ciencias Naturales,* the scientific journal established by William H. Phelps. Fifty thousand copies are being printed for distribution to Venezuelan governmental departments and schools, as well as to other institutions in South America.

Thirdly, a twenty-six-minute color film of animal life, the pick of reels taken by Miss Crane, has been assembled, provided with Spanish sound track and an introduction by Dr. Beebe. Numerous copies of this will be distributed both in Venezuela and other Latin American countries.

Rancho Grande from the Air.

The continued generosity of the Creole Petroleum Corporation has made possible this latest expedition, as well as the Spanish editions of the "Ecology" and of the motion picture film.

It is one thing to carry out a scientific expedition in a foreign country. It is much more a matter of congratulation when, in the course of

such work, firm and lasting friendships are formed, and especially when permanent contributions are made to the cultural life of that country, the influences of which may persist for many years.

Amateur Movie Contest

Because they have a specific interest in animals, Members of the Zoological Society should be interested in the American Humane Association's efforts to promote amateur motion pictures that will further a love of animals, give instruction in their care, or create a friendly, kindly, constructive interest in them. Announcement has been made of the fifth annual competition for amateurs, with a prize of $200 for the best picture and additional prizes if the entries warrant. Details may be obtained from the American Humane Association, 135 Washington Avenue, Albany 6, N. Y.

The Death of Betty, One of Our Duck-billed Platypuses

Betty, one of our three Duck-billed Platypuses, was found dead on September 6. She had lived in the Zoological Park one year, four months, and eleven days and was believed to be about two years and eight months old.

Cecil, the male Duck-bill, and Penelope, the other female, continue to be in apparent good health.

The intense cold and heavy snowfall of last winter and the record-breaking heat wave of late August, when the mean temperature for the 26th, 27th and 28th was 90 degrees and the mercury reached almost 101, were apparently responsible for the decline in Betty's condition. Last winter it was impossible to have crayfishes flown to New York from Louisiana for a period of two weeks, and earthworm supplies ran short. Penelope, who was Betty's tankmate in their winter storage quarters in the basement of the Bird House, was larger and stronger and got a major share of the earthworms. Consequently, it was noticeable this spring, when the Platypuses were put on exhibition on May 9, that Betty was not as fat as she had been last fall, and not as active.

During the heat wave, Betty was listless and did not eat with regularity. She skipped feeding for several days and on September 3 Keeper John Blair took her off exhibition and returned her to the winter quarters, hoping that quiet and coolness would restore her appetite. However, she did not feed, and died two nights later.

Betty, Penelope and Cecil were brought to the Zoological Society on April 25, 1947, by David Fleay, the Australian zoologist. They had been captured in April, 1946, in the streams near Healesville, Victoria, Australia, and Betty was estimated to be about 4½ months old at the time of capture.

Since they went on exhibition on April 29, 1947, for the summer months of last year and this, the Duck-billed Platypuses have been seen by approximately 250,000 visitors.

New Members of the New York Zoological Society

(Between July 1 and August 31)

Life

Mrs. Grace Busche Dafoe

Contributing

Mrs. Albert Andriesse
Dr. F. L. Babbott
Paul H. Cheney
F. Russell Crawford
C. W. Force
John L. Given, Jr.
W. Huntting Howell
Mrs. Wayne Johnson
Henry F. Keil
Mrs. Bertha Mack
E. W. Steiner
Robert E. Waterman

Annual

William B. Adams
L. M. Bartlett
Paul L. Boulard
Miss Kathryn E. Brown
Harold E. Cole
Seymour Eckstein
Sidney Goldschlager
William Hawker
H. Rogers Hopkins
Mrs. Arthur W. Huguley, Jr.
Mrs. Thomas F. Madigan
R. H. McCann
Hight C. Moore
Samuel Price
Giles M. Rae
Dr. Sherman Ross
Charles L. Schenck
Sam Shain
Norman I. Stotz
Richard I. Topus
James L. Townsend
Col. George F. D. Trask
Richard Turnbull
Mrs. Richard Turnbull
C. R. Vose

Conservation News

(*Continued from Page* 155)

Inter-American Conference on Conservation of Renewable Natural Resources held in Denver, Colorado on September 7 to 20 last.

At this same conference, President Osborn made the principal address before the panel on the Dynamics of Renewable Resources. George E. Brewer, Jr., addressed the panel on Education in Conservation Dynamics at the same meeting.

The Inter-American Conference was well attended not only by leading conservationists from all over the United States but by many Latin-American delegates.

Notes

Elmer Davis and Quincy Howe recently devoted large proportions of their network programs to radio reviews of "Our Plundered Planet" by Fairfield Osborn.

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"Our Plundered Planet" will appear soon in an English edition. Negotiations are in progress or inquiries have been received in reference to the translation of Mr. Osborn's book into Italian, Swedish, French and Icelandic.

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George E. Brewer, Jr., left on September 22 to attend the meetings at the International Union for the Protection of Nature in Paris. He expects to meet with the European and British members of the Foundation's Advisory Council before his return.

Publications of Interest

ROAD TO SURVIVAL. By William Vogt. 335 pp., 8 figs. William Sloane Associates, New York, 1948. $4.00.

INEVITABLY the thoughts of far-seeing men find the same channels. It was no casual coincidence, therefore, which provided in so brief a space of time two outstanding books in the same vein – William Vogt's ROAD TO SURVIVAL and OUR PLUNDERED PLANET of the Society's President. Differing in character and in their approach to the same problem, there is nothing unfortunate in their nearly simultaneous arrival, for they are complementary. They are also symptomatic of the gathering forces of that great movement, now forty years old, in which the Society, already having played a distinguished part, has assumed new and far-reaching responsibilities.

It is a movement which has outgrown its name, for Conservation is a word so wide in its implications and yet so limiting in use as almost to have become meaningless. It is to every individual a different thing. To the farmer, it is a whole soil technique; to the woodsman, use on a sustained yield basis; to the sportsman, more game to kill. To this one, it is the salvation of the Wood Duck; to that, of the Pink Lady's Slipper.

In the modern sense Conservation is indeed all these things and much more besides. It is a philosophy and a system of ethics. It is mankind's humble, if tardy, acknowledgment of himself as another biological specimen in the world of living things and his admission that he is only a part of his environment and in no way superior to it. It is an understanding of what Vogt calls "the total ecological situation" without which he claims the human race cannot escape that limbo of unthinkable misery into which it is rapidly sinking.

But why, one may ask, the urgency? Man has lived on this planet for a substantial number of years. In that time he has steadily clawed his way upward, materially, morally, and intellectually, and always, if one may judge by the wreckage, in happy disregard of ecological patterns. Indeed, no one seems to have considered the necessity for such a word until the turn of the century. There were pessimists, of course. A hundred and fifty years ago, did not Malthus sound the trump of doom? And today, do not infinitely more people live longer and in far greater comfort than they did then? On a world scale, the pattern has been one of luxuries becoming necessities for more people, be it rich and exotic out-of-season foods for me, cigarettes for you, and the used Sunday comic sections for some simple savage on the other side of the world.

Malthus and his painstaking mathematical calculations of population and production are discredited and his arguments have become meaningless for the very reasons which provided for the evolution of those bigger and better machines for taking the cream off this planet. Yet somehow, in the main, his conclusions show an annoying tendency to stand. His was an honest, even courageous, attempt to cast up the ledger, but the facts were not all in. Man today could produce a reasonably accurate balance sheet, if he wished and if he dared. It is this which Vogt insists he must do as a first step along the onerous ROAD TO SURVIVAL.

Despite the enormous complexity of the problem – the multiplication of people and the squandering of the resources on which they must live – Vogt succeeds in making his attack on it as simple and intelligible as it is direct. His method is as subtle as a riveting machine and about as inescapable. The result is not a pleasant book to read, nor was it intended to be. One does not turn to such literature (for it is that, no less) for solace.

It is written in a fine cold anger. The emotions are controlled for Vogt is too good a scientist and writes too well to let such things get the better of him. They are his tools and he uses them with a persuasiveness which is odd in one who paradoxically allows his obvious love of men to overcome his ill-concealed contempt for man.

The lashing man receives is perhaps what he deserves and any brief flash of tenderness is reserved for wildlife and particularly for birds for whom he has unbounded

affection. He can pause, whip in hand, to turn a poignant and nostalgic phrase for them among the harsh blows of his words, "We shall never again hear the music of the Eskimo curlew and with its lost song has vanished a Mozart of the prairies; we shall never be so rich again as before its passing." Unhappily, this is not the end. On this very day, for instance, comes the news that hope can now be relinquished for the survival of the Whooping Crane whose resonant call must soon be numbered among the dimly remembered things. A miracle, they say, might save the species but miracles need faith and that, as a subject, is no longer in educational curricula even in a year which will produce a record of thirty-two million students.

In all, Vogt's is a macabre tale grimly told, as in geographical order the continents and countries of the world are paraded for inspection in wretched procession. None escape – this richest least of all – whose inhabitants and their honored forbears are described as "The most destructive group of human beings who have ever raped the earth. They moved into one of the richest treasure houses ever opened to man and in a few decades turned millions of acres into a shambles. . . ."

Vogt makes no bones about which is the ROAD TO SURVIVAL. It is an austere route to which he points and the prospect of austerity and asceticism are never engaging. He echoes Micawber but in more elaborate terms – "Ecological health for the world requires above all two things: (1) That renewable resources be used to produce as much wealth as possible on a sustained yield basis. . . . (2) We must adjust our demand to the supply, either by accepting less per capita (lowering our living standards) or by maintaining less people. Since our civilization cannot survive a drastic lowering of standards, we cannot escape the need for population cuts."

Let us, however, go further than that and say flatly that any lowering of the world's standard of living is unthinkable. In vast areas of the world, famine is endemic. The Indian of India and of South America, the Chinese, the African – all are living on the edge of starvation if not over it. Even in this country today one-third of the people are reported to be undernourished. If there is any lowering of standards, it is these people who will take it first – not the butcher, the baker, and the candlestick maker, on seventy dollars a week. But inevitably their turn will come – when there is no more flour to bake and meat and tallow are simply not to be had.

We who have the luxury of leisure to look around and think a little believe we recognize the means by which the program might be carried out. But what of those who have no release from the effort merely to survive and whose whole energy is spent in the business of finding not only enough but merely something to eat? That is where the initial inertia lies. It requires leisure for the imagination to work and energy to lift the eyes even as far as the horizon.

Inventory – Knowledge – Education – Action. In logical sequence Vogt spells out the four-pronged attack in which every individual in the world must share. It was Aristotle, however, on whose ancient head is rather unfairly heaped all the wrath of Vogt the semanticist, who produced the final dictum with which no one could possibly quarrel. "In practical matters, the end is not mere speculative knowledge of what is to be done but rather the doing of it." Thus in the many cases where inventory and knowledge are sufficient, action need not be delayed for their exact completion.

There are cultural patterns and religious beliefs to change beside which the economic and political difficulties in distribution of such small surpluses as there may be pale into insignificance. Millions of Hindoo cattle are kept alive for religious reasons, hopelessly unproductive and a burden to the land. Men breed in a frenzy so that there may be descendants to pacify their manes when they themselves have become ancestors. Bride prices are named in terms of cattle and the vastly destructive goat, thus starting a whole other chain reaction. The taungya cultivator receives unmistakable warning from the spirits who infest the earth, the air, and the trees when it is time for him to desert his clearing and burn anew.

Vogt, who has seen illiterate Andean Indians religiously brush their teeth twice a day, is confident that any cultural pattern can be changed by education. Perhaps, he is right. Perhaps, even the American people can be taught that sewage is not a horrid word and that its waste is as criminal as the sacrifice of crops on the altar of price support. – A. WILLIAM SMITH.

STRANGE PREHISTORIC ANIMALS AND THEIR STORIES. By A. Hyatt Verrill. 262 pp., 92 illus. L. C. Page & Co., Boston, 1948. $3.75.

The indefatigable Mr. Verrill (this is his 106th book) blends fact and fantasy, modern science and myths, in another of his "Strange Stories" series. The scientist will be stricken by the hodge-podge, but the average layman will find it engrossing. – W. B.

DESERT ANIMALS. By Rita Kissin, illustrated by Helene Carter. 28 pp., each page illustrated. For ages up to 8 years. David McKay Company, Philadelphia, 1947. $2.50.

Children nowadays certainly absorb their natural history painlessly – and not only about such familiar fauna as Elephants, Lions, Tigers and Giraffes. The desert animals of the Southwest are mostly small and unfamiliar – the Bassarisk, Chuckawalla, Kit Fox, Elf Owl, Horned "Toad," Iguana, Kangaroo Rat, Uta, Ocellated Lizard, for example – but here they are in soft colors, in their natural setting, with a short, informative, rhyming text about each. The child who absorbs Miss Kissin's text and Miss Carter's spirited drawings will have an amazingly broad knowledge of desert fauna and perhaps will be able to put a name to some creatures that would stump its parents. – W. B.

POISONOUS DWELLERS OF THE DESERT. By Natt. N. Dodge. Popular Series No. 3. Southwestern Monuments Association, Santa Fe, New Mexico, 1947. 44 pp., 28 illus.

This is a ready reference pocket guide to poisonous animals of the great Southwest. Some of the species discussed are also resident in other sections of this country. They include venomous snakes, the Gila Monster, centipedes, scorpions, spiders and a few insects.

Thumbnail sketches are given of first aid treatment, control of dangerous invertebrates, and how to prevent being bitten or stung. Common superstitions or misunderstandings are debunked. No attempt is made to furnish keys for scientific identification of species.

The Southwestern Monuments Association and the author are to be congratulated upon compiling such a reliable and convenient booklet for popular distribution. The illustrations are adequate and well-chosen. – BRAYTON EDDY.